

**AMEC FOSTER WHEELER**  
**BUNKER HILL CENTRAL TREATMENT PLANT UPGRADE PROJECT**  
Kellogg, Idaho

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# DATA VALIDATION REPORT

Bunker Hill Central Treatment Plant

Kellogg, Idaho

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## ACRONYMS

%	percent
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
CCB	continuing calibration blank
CCV	continuing calibration verification
CLP	Contract Laboratory Program
COC	chain of custody
DL	detection limit
EPA	United States Environmental Protection Agency
ICAL	initial calibration
ICV	initial calibration verification
ID	identification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
MS	matrix spike
MSD	matrix spike duplicate
QC	quality control
RL	reporting limit
RPD	relative percent difference
SAP	sampling and analysis plan
SM	Standard Method
SVL	SVL Analytical Inc.
TSS	total suspended solids

# **DATA VALIDATION REPORT**

## **Bunker Hill Central Treatment Plant**

### **Kellogg, Idaho**

## **1.0 INTRODUCTION**

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) collected 30 water samples (including 2 field duplicates, a trip blank, and an equipment blank) between April 23 and May 30, 2018 from the Bunker Hill Central Treatment Plant in Kellogg, Idaho. Amec Foster Wheeler submitted the samples to SVL Analytical Inc. (SVL), located in Coeur D'Alene, Idaho, where they were assigned to sample delivery groups X8D0421, X8D0576, X8E0024, X8E0116, X8E0142, X8E0143, X8E0190, X8E0233, X8E0253, X8E0310, X8E0311, X8E0369, X8E0446, X8E0480, X8E0530, X8E0606, X8E0652, and X8E0672. SVL analyzed the samples for total metals by United States Environmental Protection Agency (EPA) Method 200.7, total suspended solids (TSS) by Standard Methods for the Examination of Water and Wastewater (SM) 2540D, and pH by SM 4500-H B. A list of these samples by field sample identification (ID), sample collection date, and the laboratory sample IDs is presented in Table 1.

## **2.0 DATA VALIDATION METHODOLOGY**

Amec Foster Wheeler performed Stage 4 validation on samples KT-04-30-18, KT-05-03-18, and PTM-05-03-18. The Stage 4 validation includes review and recalculation of the laboratory's analytical report and the raw analytical data. The remainder of the data underwent EPA Stage 2B validation, which includes review of sample- and instrument-specific quality control (QC) samples on data summary forms, but does not include review or validation of the raw analytical data. This data validation has been performed in general accordance with:

- Amec Foster Wheeler, 2017. Operations & Maintenance Services Sampling and Analysis Plan (SAP), Bunker Hill Central Treatment Plant Upgrade Project, Kellogg, Idaho, March 2017.
- EPA, 2017. EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic Superfund Data Review, EPA-540 R 017 001.
- The analytical methods referenced by the laboratory.

The laboratory's certified analytical report and supporting documentation were reviewed to assess the following:

- Data package and electronic data deliverable completeness;
- Chain-of-custody (COC) compliance;
- Sample Receipt;
- Holding time compliance;
- Initial calibration (ICAL), initial calibration verification (ICV), and continuing calibration verification (CCV) compliance with method specified criteria;
- Presence or absence of laboratory contamination as demonstrated by calibration and laboratory blanks;
- Accuracy and bias as demonstrated by recovery of surrogate spikes, laboratory control sample (LCS), and matrix spike (MS) samples;
- Analytical precision as relative percent difference (RPD) of analyte concentration between laboratory duplicates, LCSs/LCS duplicates (LCSs), or MS/MS duplicates (MSDs);
- Sampling and analytical precision as RPD of analyte concentration between field duplicates;
- Internal standard and surrogate compound recoveries;
- Analyte identification and quantification verification from raw analytical data (Stage 4 validation only); and
- Insofar as possible, the degree of conformance to method requirements and good laboratory practices

### **3.0 EXPLANATION OF DATA QUALITY INDICATORS**

Summary explanations of the specific data quality indicators reviewed during data validation are presented below.

#### **3.1 LABORATORY CONTROL SAMPLE RECOVERIES**

LCSs are aliquots of analyte free matrices that are spiked with the analytes of interest for an analytical method, or a representative subset of those analytes. The spiked matrix is then processed through the same analytical procedures as the samples they accompany. LCS recovery is an indication of a laboratory's ability to successfully perform an analytical method in an interference free matrix.

### **3.2 MATRIX SPIKE RECOVERIES**

MSs and MSDs are prepared by adding known amounts of the analytes of interest for an analytical method, or a representative subset of those analytes, to an aliquot of sample. The spiked sample is then processed through the same extraction, concentration, cleanup, and analytical procedures as the unspiked samples in an analytical batch.

MS recovery and precision are an indication of a laboratory's ability to successfully recover an analyte in the matrix of a specific sample or closely related sample matrices. It is important not to apply MS results for any specific sample to other samples without understanding how the sample matrices are related.

### **3.3 BLANK CONCENTRATIONS**

Blank samples are aliquots of analyte free matrix that are used as negative controls to verify that the sample collection, storage, preparation, and analysis system does not produce false positive results.

Laboratory blanks are processed by the laboratory using exactly the same procedures as the field samples. Target analytes should not be found in laboratory blanks.

Equipment blanks are prepared by passing analyte free water through or over sample collection equipment and collecting the water in sample containers. Equipment blanks are used to monitor for possible sample contamination during the sample collection process and serve as a check on the effectiveness of field decontamination procedures.

Trip blanks are vials of analyte free water that accompany sample bottles shipped to the field and back to the laboratory with field samples. Trip blanks assess contamination attributed to shipping and handling procedures, as well as contamination from containers. Target analytes should not be found in trip blanks.

Target analytes should not be found in laboratory blanks. When target analytes are detected in blanks, analyte concentrations in associated samples less than 5 times the concentration detected in the blank will be U qualified as being not detected.

### **3.4 LABORATORY DUPLICATES**

Laboratory duplicate analysis verifies acceptable method precision by the laboratory at the time of preparation and analysis and/or sampling precision at the time of collection.



#### **4.0 DEFINITIONS OF QUALIFIERS THAT MAY BE ADDED DURING DATA VALIDATION**

- J** The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- R** The sample result is rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
- U** The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- UJ** The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

#### **5.0 QUALIFICATION REASON CODES**

The following reason codes were applied to the data during data validation:

- DL** The analyte concentration is between the detection limit (DL) and the reporting limit (RL).
- HD** High RPD between laboratory duplicate results.
- HT** The EPA-recommended maximum holding time was exceeded.

#### **6.0 CHAIN OF CUSTODY AND SAMPLE RECEIPT CONDITION DOCUMENTATION**

The samples were received at the laboratory under proper COC, intact, properly preserved, and at temperatures less than the SAP-specified maximum of 6 degrees Celsius.

#### **7.0 SPECIFIC DATA VALIDATION FINDINGS**

Results from these samples may be considered usable with the limitations and exceptions described in Sections 7.1 through 8.0. Qualifiers added during validation are summarized in Table 2.

## **7.1 METALS BY EPA METHOD 200.7**

Total metals results generated by SVL may be considered usable with the limitations described in Sections 7.1.1 through 7.1.9.

### **7.1.1 Holding Times**

All samples were analyzed for metals within the SAP-specified maximum holding of 180 days.

### **7.1.2 Initial and Continuing Calibration Verification**

ICV and CCV recoveries were within method-specified limits.

### **7.1.3 Initial and Continuing Calibration Blanks**

Target analytes were not detected in the initial calibration blanks and continuing calibration blanks (CCBs), with the following exception:

- Manganese was detected at a concentration of 0.0037 milligrams per liter in the closing calibration blank associated with the analysis of sample 006-05-23-18. Manganese was detected in sample 006-05-23-18 at a concentration greater than five times the concentration detected in the blank and data usability is not adversely affected by the blank detection.

### **7.1.4 Laboratory, Equipment, and Trip Blanks**

Target analytes were not detected in the laboratory, equipment, and trip blanks associated with the analysis of these samples.

### **7.1.5 Laboratory Control Sample Accuracy and Precision**

LCS and LCSD recoveries were within the SAP-specified limits and RPDs between the LCS and LCSD results were less than the SAP-specified maximum of 20%.

### **7.1.6 Laboratory Duplicates**

SVL performed duplicate analyses on project samples KT-04-23-18, PTM-05-03-18 006-05-02-18, 006-05-04-18, 006-05-07-18, KT-05-07-18, 006-05-09-18, 006-05-11-18, KT-05-10-18, 006-05-14-18, PTM-05-17-18, 006-05-16-18, 006-05-18-18, 006-05-21-18, 006-05-23-18, 006-05-25-18, 006-05-28-18, and 006-05-30-18. RPDs between source and duplicate results were less than the SAP-specified maximum of 20%, with the following exception:

- The RPDs between lead results were high in the duplicate analyses performed on samples 006-05-25-18 and 006-05-11-18 at 33.4% and 25.3%, respectively. In both cases the

differences between primary and duplicate results were less than the RL, demonstrating acceptable analytical precision.

#### 7.1.7 Matrix Spikes/Matrix Spike Duplicates

SVL performed MS and MSD analyses on project samples KT-04-23-18, PTM-05-03-18, 006-05-02-18, 006-05-04-18, KT-05-07-18, 006-05-09-18, 006-05-11-18, KT-05-10-18, 006-05-14-18, 006-05-16-18, 006-05-18-18, 006-05-21-18, 006-05-23-18, 006-05-25-18, 006-05-28-18, and 006-05-30-18 for total metals. MS/MSD recoveries were within SAP-specified limits and RPDs between MS and MSD results were less than the SAP-specified maximum of 20%, with the following exceptions:

- Manganese (292%, 245%) and zinc (221%, 405%) recoveries were high in the MS and MSD performed on sample KT-04-23-18. Manganese and zinc were detected in the unspiked native sample at concentrations greater than four times the spike concentrations and data usability cannot be evaluated based on the performance of these analytes in this sample.
- Manganese (18.1%, 37.4%) and zinc (-163%, -104%) recoveries were low in the MS and MSD performed on sample KT-05-07-18. Manganese and zinc were detected in the unspiked native sample at concentrations greater than four times the spike concentrations and data usability cannot be evaluated based on the performance of these analytes in this sample.
- Iron (31.9%, MS), manganese (220%, MSD) and zinc (-1440%, -1790%) recoveries were outside the SAP-specified limits in the MS and/or MSD performed on sample KT-05-10-18. Iron, manganese, and zinc were detected in the unspiked native sample at concentrations greater than four times the spike concentrations and data usability cannot be evaluated based on the performance of these analytes in this sample.
- Manganese recoveries were outside the QAPP-specified limits at 22.7% and 67.9%, respectively, in the MS and MSD performed on samples PTM-05-17-18. Manganese was detected in the unspiked native sample at a concentration greater than four times the spike concentration and data usability cannot be evaluated based on the performance of this analyte in this sample.

#### 7.1.8 Analytical Sensitivity

Amec Foster Wheeler compared RLs for cadmium, lead, manganese, and zinc against applicable discharge limits to confirm that the RLs were sufficiently low to meet the discharge limits.

Non-detect results were reported to RLs less than the applicable discharge limits.

### **7.1.9 Data Reporting and Analytical Procedures**

SVL J qualified analytes with concentrations between the DL and the RL. Amec Foster Wheeler agrees that these results are quantitatively uncertain and has maintained SVL's J qualifiers. (J-DL)

## **7.2 TOTAL SUSPENDED SOLIDS BY SM 2540D**

TSS results generated by SVL may be considered usable with the limitations described in Sections 7.2.1 through 7.2.6.

### **7.2.1 Holding Times**

All samples were analyzed for TSS within the SAP-specified maximum holding time of 7 days.

### **7.2.2 Laboratory Blanks**

TSS was not detected in the laboratory blanks associated with the analysis of these samples.

### **7.2.3 Laboratory Control Sample Accuracy and Precision**

LCS and LCSD recoveries were within the laboratory-specified 90 to 110% limits and RPDs between the LCS and LCSD results were less than the laboratory-specified maximum of 10%.

### **7.2.4 Laboratory Duplicates**

SVL performed duplicate analyses on project samples 006-05-02-18, 006-05-04-18, 006-05-07-18, 006-05-09-18, 006-05-11-18, KT-05-14-18, 006-05-16-18, 006-05-18-18, 006-05-21-18, 006-05-23-18, 006-05-25-18, 006-05-28-18, and 006-05-30-18. RPDs between source and duplicate results were less than laboratory-specified maximum of 10%, with the following exception:

- RPDs between TSS results were high in the duplicate analyses performed on samples 006-05-18-18 and 006-05-28-18 at 33.3% and 18.2%, respectively. In both cases the differences between primary and duplicate results were less than the RL, demonstrating acceptable analytical precision.

### **7.2.5 Analytical sensitivity**

Amec Foster Wheeler compared RLs for TSS against applicable discharge limits to confirm that the RLs were sufficiently low to meet the discharge limits. Non-detect results were reported to RLs less than the applicable discharge limits.

### **7.2.6 Data Reporting and Analytical Procedures**

SVL J qualified analytes with concentrations between the DL and the RL. Amec Foster Wheeler agrees that these results are quantitatively uncertain and has maintained SVL's J qualifiers. (J-DL)

## **7.3 PH BY SM 4500 H-B**

pH results generated by SVL may be considered usable with the limitations described in Sections 7.3.1 through 7.3.4.

### **7.3.1 Holding Times**

All field samples were analyzed for pH after the EPA-recommended maximum hold time of 15-minutes from sample collection. Amec Foster Wheeler J qualified the pH results from these samples because of the missed hold times. (J-HT)

### **7.3.2 Laboratory Control Sample Accuracy**

LCS recoveries were within the laboratory-specified 98.5 to 101.5% limits.

### **7.3.3 Laboratory Duplicates**

SVL performed duplicate analyses on samples KT-04-30-18, 006-05-02-18, 006-05-04-18, 006-05-07-18, 006-05-09-18, 006-05-11-18, 006-05-14-18, 006-05-16-18, 006-05-18-18, 006-05-21-18, 006-05-23-18, 006-05-25-18, 006-05-28-18, and 006-05-30-18. RPDs between source and duplicate results were less than laboratory-specified maximum of 5%.

- The RPD between pH results was high at 7.9% in the duplicate analysis performed on sample 006-05-25-18. Amec Foster Wheeler J qualified the detected pH result from this sample due to potential analytical imprecision. (J-HD)

### **7.3.4 Data Reporting and Analytical Procedures**

There were no anomalies associated with the pH analysis of these samples.

## **8.0 FIELD DUPLICATES**

Field duplicates were collected with samples: 006-05-02-18 (QC-05-02-18) and KT-05-17-18 (QC-05-17-18).

Target analyte detections are summarized in Table 3. Precision values were less than the SAP-specified maximum of 30%, or the differences between detected concentrations were less than the RL, demonstrating acceptable sampling and analytical precision.

## 9.0 SUMMARY AND CONCLUSIONS

Amec Foster Wheeler reviewed 177 data records from field samples during this validation. All the data generated are usable and of acceptable quality with the addition of qualifiers presented in Table 2. Qualifier definitions are summarized in Section 4.0, reason codes are summarized in Section 5.0, and qualified data are summarized below.

- Amec Foster Wheeler J qualified 41 records (23.2%) as being estimated concentrations because of hold time exceedances, imprecision between laboratory duplicate results, or analyte concentrations between the DL and RL.

No records were rejected and 100% of the data should be considered valid with the addition of the qualifiers presented in Table 2.

## REFERENCES

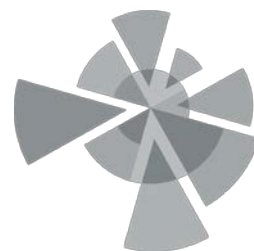
Amec Foster Wheeler, 2017. Operations & Maintenance Services Sampling and Analysis Plan (SAP), Bunker Hill Central Treatment Plant Upgrade Project, Kellogg, Idaho, March 2017.

EPA, 2017. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, EPA-540-R-2017-001.

## **LIMITATIONS**

This report was prepared exclusively for the Bunker Hill Central Treatment Plant by Amec Foster Wheeler Environment & Infrastructure Solutions, Inc. The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in Amec Foster Wheeler services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This data validation report is intended to be used by the Bunker Hill Central Treatment Plant in Kellogg, Idaho only, subject to the terms and conditions of its contract with Amec Foster Wheeler. Any other use of, or reliance on, this report by any third party is at that party's sole risk.





## **TABLES**

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**TABLE 1**  
**Field Samples Submitted to SVL Analytical, Inc.**  
**Bunker Hill Central Treatment Plant Upgrade Program**  
**Kellogg, Idaho**

Field Sample ID	Collection Date	SVL Analytical, Inc. Sample ID	Notes
KT-04-23-18	4/23/2018	X8D0421-01	
KT-04-26-18	4/26/2018	X8D0421-02	
KT-04-30-18	4/30/2018	X8D0576-01	Stage 4 Validation
TB-05-02-18	5/2/2018	X8D0576-02	Trip Blank
RB-05-02-18	5/2/2018	X8D0576-03	Equipment Blank
KT-05-03-18	5/3/2018	X8D0576-04	Stage 4 Validation
PTM-05-03-18	5/3/2018	X8D0576-05	Stage 4 Validation
006-05-02-18	5/2/2018	X8E0024-01	
QC-05-02-18	5/2/2018	X8E0024-02	Field Duplicate of 006-05-02-18
006-05-04-18	5/4/2018	X8E0116-01	
006-05-07-18	5/7/2018	X8E0142-01	
KT-05-07-18	5/7/2018	X8E0143-01	
1-KT-05-10-18	5/10/2018	X8E0143-02	
KT-05-08-18	5/8/2018	X8E0190-01	
006-05-09-18	5/9/2018	X8E0190-02	
KT-05-10-18	5/10/2018	X8E0233-01	
006-05-11-18	5/11/2018	X8E0253-01	
006-05-14-18	5/14/2018	X8E0310-01	
KT-05-14-18	5/14/2018	X8E0311-01	
KT-05-17-18	5/17/2018	X8E0311-02	
PTM-05-17-18	5/17/2018	X8E0311-03	
QC-05-17-18	5/17/2018	X8E0311-04	Field Duplicate of KT-05-17-18
KT-05-15-18-LF	5/15/2018	X8E0369-01	
006-05-16-18	5/16/2018	X8E0369-02	
006-05-18-18	5/18/2018	X8E0446-01	
006-05-21-18	5/21/2018	X8E0480-01	
006-05-23-18	5/23/2018	X8E0530-01	
006-05-25-18	5/25/2018	X8E0606-01	
006-05-28-18	5/28/2018	X8E0652-01	
006-05-30-18	5/30/2018	X8E0672-01	

**Notes:**

ID = identification

**TABLE 2**  
**Qualifiers Added During Data Validation**  
**Bunker Hill Central Treatment Plant Upgrade Program**  
**Kellogg, Idaho**

Sample ID	Analytes	Concentrations	Qualifiers and Reason Codes
006-05-02-18	pH	6.6 SU	J HT
006-05-02-18	Lead	0.0061 mg/L	J DL
006-05-04-18	pH	6.8 SU	J HT
006-05-04-18	Lead	0.0054 mg/L	J DL
006-05-07-18	pH	7.0 SU	J HT
006-05-09-18	pH	6.9 SU	J HT
006-05-09-18	pH	6.9 SU	J HT
006-05-09-18	Lead	0.0043 mg/L	J DL
006-05-09-18	Lead	0.0043 mg/L	J DL
006-05-11-18	pH	6.7 SU	J HT
006-05-11-18	Lead	0.0036 mg/L	J DL
006-05-14-18	pH	6.8 SU	J HT
006-05-16-18	pH	6.7 SU	J HT
006-05-16-18	pH	6.7 SU	J HT
006-05-18-18	pH	7.6 SU	J HT
006-05-18-18	Lead	0.0038 mg/L	J DL
006-05-21-18	pH	7.1 SU	J HT
006-05-21-18	Lead	0.0042 mg/L	J DL
006-05-23-18	pH	7.2 SU	J HT
006-05-23-18	Lead	0.0033 mg/L	J DL
006-05-25-18	pH	7.3 SU	J HT, HD
006-05-25-18	Lead	0.0046 mg/L	J DL
006-05-28-18	pH	7.1 SU	J HT
006-05-30-18	pH	7.2 SU	J HT
1-KT-05-10-18	pH	2.7 SU	J HT
KT-04-23-18	pH	2.9 SU	J HT
KT-04-26-18	pH	2.9 SU	J HT
KT-04-30-18	pH	2.7 SU	J HT
KT-05-03-18	pH	2.8 SU	J HT
KT-05-07-18	pH	2.8 SU	J HT
KT-05-14-18	pH	2.8 SU	J HT
KT-05-17-18	pH	2.8 SU	J HT
PTM-05-03-18	TSS	0.2 mg/L	J DL
PTM-05-03-18	pH	7.1 SU	J HT
PTM-05-17-18	TSS	0.4 mg/L	J DL
PTM-05-17-18	pH	7.0 SU	J HT
QC-05-02-18	TSS	0.6 mg/L	J DL
QC-05-02-18	pH	6.5 SU	J HT
QC-05-02-18	Lead	0.0060 mg/L	J DL
QC-05-17-18	TSS	0.4 mg/L	J DL
QC-05-17-18	pH	7.0 SU	J HT

**Notes:**

mg/L = milligrams per liter

EPA = United States Environmental Protection Agency

ID = Identification

SU = Standard Units

TSS = Total Suspended Solids

**Qualifier Definition:**

J = The analyte was positively identified; the associated numerical value is approximate.

**Reason Codes:**

DL = The analyte concentration is between the detection limit and the reporting limit.

HD = High relative percent difference between laboratory duplicate results.

HT = The EPA-recommended maximum holding time was exceeded.

**TABLE 3**  
**Field Duplicate Detections**  
**Bunker Hill Central Treatment Plant Upgrade Program**  
**Kellogg, Idaho**

Analyte	Method	Average RL	Primary Concentration	Field Duplicate Concentration	RPD	Notes
<b>006-05-02-18 and QC-05-02-18</b>						
Lead	EPA 200.7	0.0075 mg/L	0.0061 J	0.0060	1.7%	
Manganese	EPA 200.7	0.008 mg/L	5.16	5.25	1.7%	
Zinc	EPA 200.7	0.01 mg/L	0.352	0.358	1.7%	
TSS	2540D	1 mg/L	1.0	0.6	50.0%	± RL
pH	4500H	SU	6.6 J	6.5	1.5%	
<b>KT-05-17-18 and QC-05-17-18</b>						
Cadmium	EPA 200.7	0.002 mg/L	1.36	1.3	3.7%	
Lead	EPA 200.7	0.0075 mg/L	0.0075	0.0080	6.5%	
Zinc	EPA 200.7	0.01 mg/L	12.1	11.7	3.4%	
TSS	2540D	1 mg/L	0.4 J	0.4 J	0.0%	
pH	4500H	SU	7.0 J	7.0 J	0.0%	

**Notes:**

mg/L = milligrams per liter

SU = standard units

EPA = United States Environmental Protection Agency

TSS = Total Suspended Solids

RPD = relative percent difference

RL = reporting limit

**Method:**

2540D = Total Suspended Solids by SM 2540D

4500H = pH by SM 4500 H-B

EPA 200.7 = Metals by EPA Method 200.7

**Qualifiers**

± RL = The difference between analyte concentrations is less than the reporting limit, demonstrating acceptable sampling and/or analytical precision.

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample